

Focus group discussion report

From Gorosole (Ambo), Laku (Shambu), Maksenit (Gonder), Zefie
(Debre Tabor)

July 2012

Compiled by Catherine Pfeifer

With contributions from:

In Oromia

Zerihun Abebe (OARI),
Girma Aberra (IWMI)
Lelise Ararsa (OARI)
Ajabush Defar (OARI)
Bayissa Gedefa (OARI)
Gerba Leta (ILRI)

In Amhara

Mulugeta Habtemichael (ILRI)
Kibruyesefa Sisay (ARARI)



CGIAR Challenge Program on
WATER & FOOD
Nile

ILRI
INTERNATIONAL
LIVESTOCK RESEARCH
INSTITUTE

IWMI
International
Water Management
Institute

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1 Introduction

1.1 Background

Nile 3 has developed feasibility maps, these are maps that combine bio-physical suitability with willingness of adoption, both for single rainwater management practices as well as for combinations of practices at landscape scale. The biophysical suitability is based on suitability condition identified through experts and literature, whereas willingness of adoption is computed based on actual data from a farm household survey (IFPRI) from 2005.

In order to validate these maps, Nile 3 needs to understand adoption and non-adoption of rainwater management practices and strategies. A multi-scale approach, allowing to capture dynamics from the farm and from the landscape scale has been chosen. To capture the farm scale, 600 farmers in 7 different watersheds of the Ethiopian Blue Nile, including the N2 watersheds are chosen. In the 4 new watersheds, focus groups are run capture the landscape scale. These focus group discussions bring together key informant from the community and ask them to imagine the best possible rainwater management strategy for their watershed and then discuss what hampers the implementation of that strategy.

This report aims at bringing all the information collected during the focus group discussions and transect walks together and serve as reference for the validation process. Also find some short reports from this field work with more pictures and video material under <http://catherinepfeifer.blogspot.com/search/label/N3%20field%20report%20series>.

2 Methodology

2.1 The landscape approach

We have the task to understand why farmers do not adopt some rainwater management strategies despite of their potential benefits. Under rainwater management strategies, we understand a combination of rainwater management practices that increases water infiltrations in the upslope a landscape, soil and water conservation in the midslope and that increase water productivity in the downslope. Rainwater management practice has to be understood in very broad terms and include beyond water harvesting a whole range of practices affecting crops, livestock and trees.

A range of practices has been selected, making sure that all the zones and land used are covered. The selection was made based on GIZ major activities in Ethiopia. The modeled practices are soil/stone bunds, terraces, gully rehabilitation/check dams, multipurpose trees, orchards (apple and mango), river diversion, wells, water harvesting/ponds, grassland management (enclosure, limiting animal movement, oversowing).

2.2 Selected watersheds

For new watershed have been selected by OARI (Oromia agricultural research institute) and ARARI (Amhara regional agricultural research institute). The following selection criteria's where used to select the new sites :

- Making sure to encounter all the modeled practices at least in one of watersheds
- Having watershed with strong NGO intervention and watershed with little NGO intervention
- Size and slope of the watershed : the watershed should be relatively small, i.e. manageable by one or two communities and therefore fit our concept of landscape within a short distance
- Existing connection through OARI and ARARI

Based on these criteria, Gorosole watershed (Ambo) and Laku watershed (Shambu) have been chosen in Oromia as well as Maksenit watershed (Gonder) and Zefie watershed (Debre Tabor) in Amhara region shown in Figure .

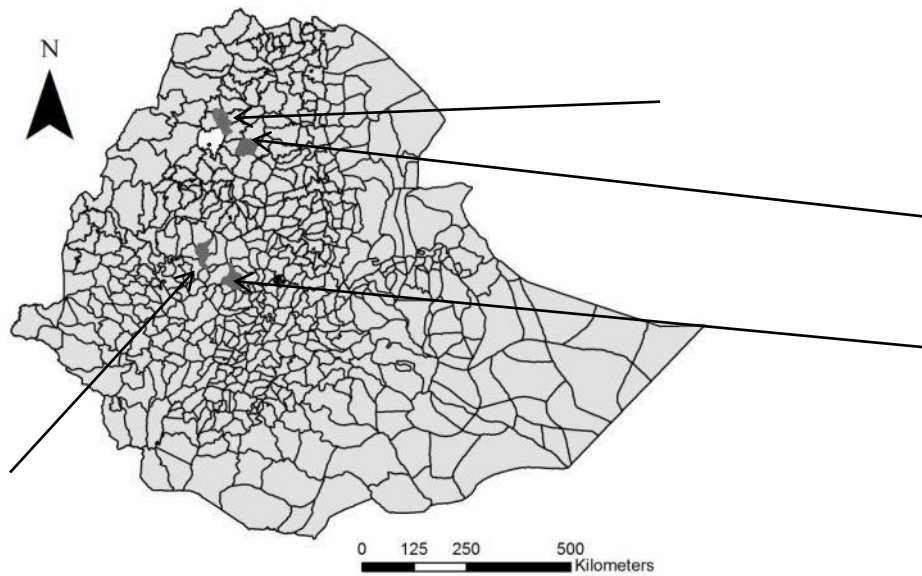


Figure 1 : locations of the selected watershed in Ethiopia

2.3 Transect walk

Each watershed was first assessed with a transect walk, allowing to all the supporting staff of the focus group discussion to understand the boundaries of the watershed, as well as the different land-uses and already existing practices adopted in the area.

2.4 Focus group discussion based on an adapted version of the “Happy strategy game”

The focus group discussion itself is based on three different steps :

1. Participatory mapping exercise in separate group for female and male
2. A adapted form of the “Happy Strategy game” in separate group for female and male
3. A group mixt discussion (both male and female together)

Preliminary to the whole focus group discussion, an extended introduction made sure that the farmers understood the purpose of the exercise including our broad definition of rainwater management and the no wrong expectations are raised.

2.4.1 The participatory mapping

The participants are given pencil and rubbers as well as flip chart paper and are asked to draw the border of the watershed, the rivers, the roads and the settlement. When everyone agrees on these features, **the border is marked in black, the roads in red, and the streams in blue.**

In a second stage, different land-use/land cover can be indicated with colored post-it : **green for forest, pink for degraded land, grey for grazing land, yellow or what is left over (white) represents crop land.**

2.4.2 The adapted form of the “Happy Strategy” game

Initially the Happy Strategy game was conceived as a game for stakeholders and scientists to validate our database of practices and come up with a rational on how to combine practices into strategies. The game consists of cards that describe about 30 rainwater management practices in terms of purpose and feasibility. In its initial form, participants are asked to select a practice and to find other participant to form a “happy strategy” (inspired by the game known as “happy family”) around a given landscape. Rule made sure that participant prefer to “trade” practices with other landscape, increasing interaction and discussion among participants rather than changing cards at the “help desk” or the “bank” that holds the whole stock of cards.



Figure 2 : Gerba introducing the focus group discussion and the happy strategy game to the community

For the focus group, these cards have been translated into Oromo and Amharic. In a first step the participants were asked to name all rainwater management practices they know of. It not mentioned the 8 modeled practices are explicitly asked for. Participants can then choose their favorite practice independently if it is existing or not and come back into the discussion group. Each participant places the card in the location on the map where it would be most suitable and reaches a consensus with the other participants. If a participant has a card that has already been discussed, she/he can change the card. After the first round, one can go for a second round with the “second favorite practice” until no new practices are suggested. The game contains innovation cards that are empty practice cards that can be filled if the suggested practice is not part of the game.



Figure 3: the cards of the “happy strategy game” ready to be selected

Along the discussion around placing the cards, one can discuss the suitability conditions, the benefit of the practices. If it has been adopted, what type of support was available. If it has not been adopted, one can discuss why, what hampers the adoption. These limitations are captured on the “intervention cards”, which describes support needed for the implementation of the strategy which goes beyond farmer’s individual decision making.

Finally beneficiaries and upstream-downstream effect can be discussed when the selected combination is discussed in more general terms.

2.4.3 Final mixt group discussion

In a final step of the focus group, both group present each other's work and discuss the differences. In this way, the work of each group can be validated and differences discussed.

2.5 Approach to map validation

Validating feasibility maps with real observations from the ground is tricky. Indeed, one might find locations in which a given practice is suitable but has not been adopted. This does not automatically imply that the suitability or the feasibility conditions are wrong. It might be that on those locations adoption is hampered by an external issue that could not be captured correctly in the adoption model. Indeed, many factors simply cannot be and might never be represented in a spatially explicit manner, as for example, religious believes, lack of collective action, lack of access to the necessary input or lack of access to relevant and high quality training and advice cannot be mapped out.

Table 1 : comparing adoption and non-adoption with the suitability and feasibility maps outcome

	Not suitable	Suitable	Feasible
Non-adopted	Right prediction	Wrong suitability conditions OR The adoption of the practice might be hampered by an external issue	Wrong suitability conditions OR The adoption model does not capture the socio-economic and institutional constraints correctly
Adopted	Wrong suitability conditions or practice has been promoted in a governmental campaign	Right prediction	Right prediction

Also in the Ethiopian context, a practice can be adopted on a non-suitable location. Indeed a practice might have been promoted through a governmental campaign obliging farmers to adopt

practices on not suitable locations. Therefore a practice observed on the ground is not automatically a proof that suitability conditions have been met.

In order to identify if the suitability/feasibility maps are built on wrong assumptions or if adoption has been hampered by a non-mapable constraint (implying that the location is suitable even if no farmer has adopted the practice), the focus group discussion focuses on the practices farmers would like to have regardless of having adopted it or not. In this way, a farmer can indicate that the area is suitable and suggest the intervention needed in order to enable the adoption. Also when a practice has been adopted on a non-suitable location, farmers can be asked about the reason of adoption and perceived benefit.

3 Gorosole watershed (Ambo, Oromia)

3.1 Description of the watershed

The Gorosole watershed is cross by the road from Ambo to Bako. The watershed has clearly defined boundary. It has a hillside on both side and in the middle there is a perennial river, that is fed by non-perennial streams. The upslope is covered by forest.



Figure 4 : view towards the outlet in Gorosole

It is a densely used landscape. Very little soil and water conservation can be seen. The few that are there are not well spaced, are not built correctly, or have not been correctly maintained. Despite of that, some good practices can be seen such as keeping some crop residues in the fields.



Figure 5 : The vegetated gully and the cropland with farm trees

The landscape has gullies that are vegetated and look relatively well maintained. It seems that the vegetation in the gullies is natural, and no big intervention was needed to maintain them, except for forbidding to cut the trees in the gully. On one side of the watershed, the fields have spare farm trees, mainly acacia. Also some woodlot of natural forest can be found on worshipping location. There is no communal grassland, and livestock intensity seems to be important and therefore access to fodder a real challenge. One of the villages is at the edge of the watershed, only very few settlements can be found in the watershed.



Figure 6 : the upland of the watershed

3.2 Discussion from the women's group

3.2.1 Participatory mapping

Participants started with drawing the main river called Kile, then the perennial affluent (blue line) and then the non-perennial affluent (dotted blue line). Then they draw the border (black line) and finally they draw the asphalt road (red line) crossing the middle of the basin and the seasonal paths (dotted red lines). Then they placed the land uses. They started with the forest (green papers), placing them on the right locations and indicating the name of each location. Then they looked degraded land and grazing land. They mentioned that there is only very little grazing land which is a problem for the community.



Figure 7 : map of Gorosole developed by the woman's group

3.2.2 Preferred landscape

Table 2 shows the practices proposed by women in the Gorosole watershed as well as their location. Apple were proposed in the upslope, because they are suitable in the highlands and are perceived as potentially high income generating because apple price is high. Around the perennial rivers, traditional river diversion can be found. On locations around the river where diversion are not feasible, a motor pump could be used for irrigation. On the degraded land, gully rehabilitation including check-dam and tree planning is suitable and has been implemented. Better community mobilization would be needed to maintain the structures. Sesbania, is a nitrogen binding fodder tree and can be found in many cropland areas in the watershed. Finally the women mentioned that livestock intensity is a big problem in the watershed and there is not sufficient grazing land. Therefore they proposed a whole

Table 2 : practices proposed by the women's group in Gorosole

Practice chosen	Location	Status in the watershed	Intervention
Apple	Upslope	Not adopted	Access to apple seedlings
River diversion	Around the perennial rivers	Adopted	Access to material to improve the diversions
Motor pump	Around the perennial river where diversion is not possible	Not adopted	Access to the pump Access to finances
Stone bunds	Midslope	Adopted	
Check-dam/gully rehabilitation	Degraded land	Adopted	Better community mobilization of maintaining the infrastructure
Sesbania	Crop land	Adopted	
Oversowing	Grazing land	Not adopted	Access to forage seeds Training

Destocking livestock	Everywhere	In process (push by the government)	
Limiting animal movement	Everywhere	In process (push by the government)	
Stone bunds	Midslope, lack of adoption in the lowland	Adopted but not sufficiently	Better coordination among farmers to address labor shortage

Multipurpose trees :

Sesbania grows in all agro-ecological zones of the watershed

Orchards

Fruit trees are not existing in the watershed. Women would like to have apple trees, as they can expect some cash income from the apples. They cannot plant apples tree because they don't know where to the seedling.

Roof rainwater harvesting, ponds, wells

Water harvesting is not perceived as necessary, as there is sufficient water the whole year round in the watershed.

Gully rehabilitation

Women indicated that the degraded land were very degraded and needed to be rehabilitated. In the upland this has been done by planting sesbania. More could be done in terms of gullies in the lowlands.

Stone bunds

As there are enough stones in the watershed, it is a relatively easy practices. But as it is very labor intensive, the women expect that those should be built in some kind of community action.

River diversion +pump:

The plots that are irrigated thanks to river diversion are used to grow onions. The river diversion are traditional diversion weir constructed by the farmers themselves. Women perceive that river diversion have been adopted wherever possible. Other area could be reached if they would have access to a pump. Unfortunately a pump is too costly, as well as the access to the pump and to its spare parts its difficult.

Limiting animal movement and destocking

Livestock is very intensive and in seen as a polluting factor in the community. Therefore women think one should limit animal movement and decrease the amount of livestock.

3.2.3 Difference with the existing landscape and interventions needed

The women's group proposed three practices that were not adopted. Apple trees are not planted despite of their suitability. Smallholders think that apple tree could improve their livelihoods as apple have a high market price. The reason for non-adoption is the lack of access to the seedling.

Livestock intensity is very high in the watershed and fodder is a limitation. Therefore they would like to oversow their grazing land both communal and private in order to produce better quality forage. This practice has not been adopted because they lack the access to the seeds. The women also mentioned that even if they get the seeds, they don't know how to use them and they would need some training. Finally the women proposed to use of a motor pump for irrigating location around the perennial river where river diversion is not possible. But a motor pump in out of reach, as it is not possible to access it in the area, and even if they would not afford it. They would be thinking about it if there would be both access to the pump and to credit.



Figure 8 : Women discussing the border of their watershed in Gorosole

3.2.4 Trade-off discussed

Women mentioned that with the river diversion and the proposed pumping downstream farmers might not get sufficient water anymore.

3.3 Discussion from the men's group

3.3.1 Participatory mapping

As an approach/process, farmers preferred to start the sketch mapping by drawing the main river called Kile (in Blue). The main river helps the group as reference point. As a follow-up, boundary of the watershed that lays over two kebeles Chanco_Obi and Kile borodo nicely mapped with the contribution from all participants. All weather road and various paths across and along the watershed have been subsequently drawn. Settlement and land use/cover were also denoted on the sketch map by sincere participation of all with determination and relative precision to the best of their knowledge. During the process farmers commented that virtually all parts of the watershed is characterized by terrain feature or step slope. On top of this, they pointed out that the watershed is largely occupied by crop production. In most cases only very pockets of grazing land that seasonally put under fallow and then back to crop production privately owned by the farmers. In addition, there are also pieces of grazing land found scattered on the river side and marshy area. Almost all the grazing reserves are privately owned though free grazing during the off season gives access to all. At the end the group categorized the watershed in to three different zones (Z_1 - Z_3) based on the altitude and agro ecology, and has also affixed legend for the watershed. This initial exercise ultimately simplifies playing the happy strategy game.

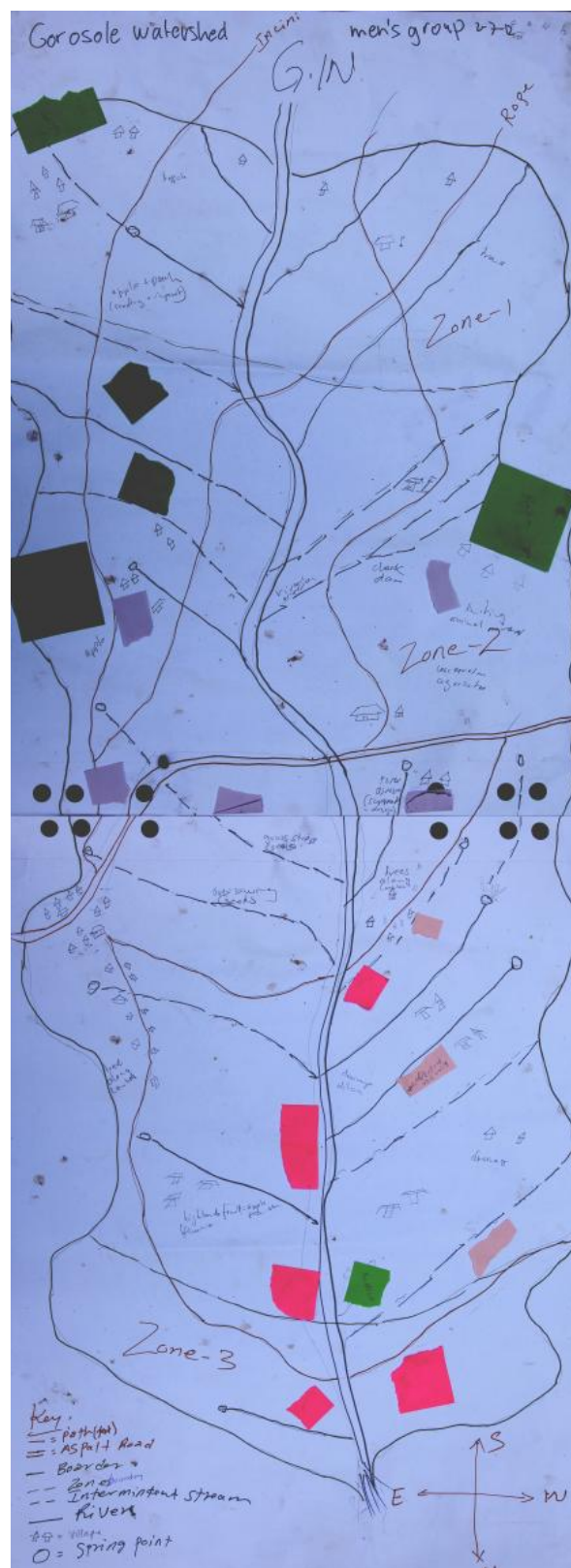


Figure 9 : map of Gorosole developed by the men's group

3.3.2 Preferred landscape

During the process of describing the preferred landscape, farmers were asked to mention all the rainwater management practices.

Farmers in the group have mentioned numerous conventional and modern rain water management technologies/practices those are working in their area. The major are:

- Drainage ditch (conventional practices)
- Furrow (contour) tillage
- Small scale river/stream diversion
- Bunds (both stone and soil)
- Cut off drain
- Grass strip
- Multipurpose tree (MPT) particularly Sesbania
- Check dam



Figure 10 : A farmer from Gorosole placing the apple tree card into the upslope of the watershed

Apart from the conventional practices, most of the rain water management technologies are largely implemented on the zone 1 or upper watershed areas of Chancha Obi kebele. The

resident farmers have got the input and experience largely from the anonymous NGO and also got lesson from the office of Agriculture (DAs).

Table 3 shows the list of practice that the farmers have selected for their watersheds.

Table 3 : practices proposed by the men's group in Gorosole

Practice chosen	Location	Status in the watershed	Intervention
Apple	Upslope	Not adopted	Access to apple seedlings
Peach tree	Upslope	Not adopted	Access to apple seedlings
Trench	Upland	Adopted	
River diversion	Around the perennial rivers	Adopted	Access to material to improve the diversions (better design) Access to finances
Grass strips	Midslope	Adopted (upland only)	Access to forage seed
Bunds	Midslope, upslope	Adopted	
Drainage ditch	Midslope	Adopted	
Cut of drains	Midslope	Adopted	
Trees along contour	Farm land	Adopted	
Conservation agriculture	Upslope	Adopted	
Check-dam/gully rehabilitation	Non-perennial streams	Adopted	
Sesbania	Crop land	Adopted	
Oversowing	Grazing land	Not adopted	Access to forage seeds

During the first round play, farmers selected and allocated cards both for the **innovation** and from existing practices. As an entry to the individual exercise/ game, farmers select large scheme irrigation (**river diversion**) in group as an innovation with which they kicked off the game. Associated intervention need like financial support to upgrade the scarce and scattered irrigation endeavor limited to few farmers was raised. Hence, farmers envisaged the necessity to outreach the existing benefit to other more non-benefiting farmers. To this effect the farmers need materials and technical support. Materials like cement and technical support like in layout, designing and developing the diversion mentioned as very important.

As follow-up of the game, practices like highland fruit (apple and peach), grass strips, cut off drain (2), check dam, contour hedge/life fence (2), conservation agriculture, drainage ditch and stone/soil bund were initially opted in that order and allocated by the farmers to the respective site where the benefit can be accrued if properly implemented by the resident farmers.



Figure 11 : the men's group in Gorosole listing to the instructions

Large scheme irrigation (river diversion):

On the sketch map farmers denote/locate the scheme development on the northwest part of the watershed at the bottom side of the main asphalt road. If large scheme irrigation develops in that direction they believe that it can command large area of land and make large community beneficiary. Though they have tried to divert using sand in bags during the dry season, rainfall and large volume of river flow got collapse every effort each season. As a result, farmers gave up the efforts because of its unsustainability. Besides, financial and technical shortage also

constrains to put in place appropriate and sustainable scheme. Stony nature of the land also hinders/retard the progress.

Highland fruit (apple and peach):

A farmer choose high value crops like highland fruit particularly apple as an **innovative** practice for zone 2 (midland) and zone 1 (highland). He justified that the agro ecology is ideal for growing apple. Besides, his access to irrigation water would help him to manage the crop efficiently. Another farmer also selected peach as **innovation** practice to be implemented in similar areas. However, planting material (seedling) supply from concerned development promoters be it NGO or GOs is welcomed by the farmers as **intervention**.

Grass strips:

Grass strips first introduced to the upstream (zone 1) of the watershed by the anonymous NGO. Its benefit could also be expanding to the gentle slope area of the middle and lower part of the watershed. Apart from the use for cut and carry system for livestock feed, a farmer described the importance of grass strips for various land management practices. Particularly, reduction of soil erosion and downstream siltation, mentioned among others.

Cut off drain:

Cut off drain is largely recommended by the farmers for the upstream and midstream (zone 1 & 2) steep slope area where erosion makes its start to travel long ways downstream. The implication is that the structure reduces runoff and safeguards the soil structure and fertility by arresting the erosion impact.

Check-dam:

According to a participant, erosion is a series and sever problem in the midland (zone 2) of the watershed. The volume of the runoff is largely increased in this part. Hence, landslide and gully formation is aggravated. Therefore, check-dam is very important to arrest the expansion of gully. Land slide and expansion of the mouth of the river is also common in this part of the zone extending to zone 1 (upstream) area. To reduce the impact of expansion farmers plow their farmland a bit far away from the damage area to arrest the progress of the slide from entering in to the heart of their farmland.

Contour hedge (life fence):

Multipurpose trees (MPTs) particularly Sesbania is considered as component of contour hedges. Such plantation is favored everywhere in the watershed particularly around the homestead.

Introduction of MPTs has been made by the office of agriculture in the mid to lower area and by anonymous NGO particularly on the upstream area of the watershed. Farmers suggested they are using MPT for wind break, fence, animal feed and for fuel wood.

Conservation agriculture:

CA is largely favored by the farmers in the three watershed zones. Some of the beneficial contributions of conservation agriculture are listed as below:

- Supply more soil organic matter
- Improve soil fertility and crop productivity
- Reduce runoff
- Improve soil water retention capacity.

However, the practice is not yet popularized in the watershed.



Figure 12 : The men's group presenting their work

Drainage ditch:

Drainage ditch is a conventional practices selected by the farmers as innovation to drain excess water from the farmland. It is largely applied for in situ rainwater management by almost all farmers so as to reduce the impact of erosion.

Stone/soil bund:

Bund making discovered as an ideal practices for all part of the watershed. Step slope nature of the watershed attribute for the widespread need of bund. However, stone bund was first

introduced in the upper watershed similar to the grass strip and MPTs by the anonymous NGOs. Currently, however, soil bund targeting the degraded and largely vulnerable area has been implemented on the upper side of the watershed (z1 & z2). From our observation, however, although it is not technically appropriate we have also visited soil bund in the downstream of the watershed. Development agents have assisted the introduction of the practice at larger scale.

3.3.3 Difference with the existing landscape and interventions needed

According to the farmers, the watershed in which they are currently living has been gradually evolving to the negative feature and associated consequence. This implies its feature and the benefit it offers in the past have been completely changed. Elders were tried to see the hindsight to recall and relate what the watershed looks like in the old days. Less crop land but higher yield per unit area; more forest cover and massive biodiversity pool, uniform rainfall intensity and distribution, green land, etc., were suggested. Currently, however, the rainfall pattern has become more erratic, more reduced crop production and productivity and other climate and landuse related anthropogenic calamities are getting escalate. As a result, series of threats confronts agricultural production. In contrast, farmers anticipated positive future as a dream or ideal watershed that could replace the existing one. The dream could become a reality by integrating appropriate rainwater management practices in to the existing system. In such a way the ideal watershed feature looks /mimic the past watershed where the ecosystem is resilient and very less disturbed and ideal to obtain reliable production and ecosystem functioning. Therefore, farmers envisaged the future as the place where food security ensured while conserving natural resource bases. Among the major expectation list under the dream watershed are green area, food secured community, increased ground water level, reliable rainfall and its distribution, reliable and friendly weather, access to adequate and clean water for both human and livestock. Based on their perception, four practices were not sufficiently adopted in the watershed : improved river diversion, highland fruits (apple and peach), oversowing, grasstrips.

River diversion should be improved, with better design and concrete material. Both the access to the material and to the needed finances hampers the development of better irrigation schemes. Highland fruits are like in the women's groups seen as a high potential to improve incomes. Non-adoption is liked to the lack of access to seedlings. Grasstrips are adopted only in the upslope. Smallholders think that it would be appropriate to have them on other locations too, but

lack in the access to the grass seeds. Similarly, oversowing private and communal grazing land was suggested, but cannot be implemented as long as it is not possible to access the right seeds.

3.3.4 Trade-off discussed

According to the participant farmers', if all the selected practices are integrated and properly implemented, every farmers residing in different part/zone of the watershed will become the beneficiary. However, farmers believed that the action should have to begin in the upstream (zone₁) of the watershed. In line with this, a farmer remembers and told us local saying “once the water touches the head, it never fails to reach the foot”. Similarly, either the positive or the negative impact of the watershed management equally reaches all other zones of the watershed. Explicitly, positive consequence that begins in the upstream would gradually extend down to reach the downstream. Hence, farmers envisaged the tradeoff among the integrated watershed management practices. Accordingly, all farmers become beneficiaries of the proper implementation. However, if the practices fail to integrate and improperly implemented the middle and lower watershed area are highly vulnerable to the runoff and siltation. Hence, they are becoming the loser.

3.4 Comparison with the first version of suitability maps

The suitability map for Ambo district suggested that we should find apple trees, river diversion, grassland management soil bunds and terraces. All of them have been mentioned in the focus groups. Apple trees as well as grassland management are not adopted due to the lack of access to seeds and training but would be in principle adopted with the correct interventions.

3.5 Final mixt discussion, participant's reflection

At the end of our happy strategy game exercise in men group, we have coverted farmers to express their view about their general observation of the day. A farmer starts with statement “our period is the time to make choice between either to live or not to live”. As crop production is highly vulnerable to climate uncertainty that arise from various natural and anthropogenic factors, the future is full of gloomy and despairs. Hence a country like Ethiopia could only develop if there is integration/sharing of resources and knowledge like this one. Hence, they would be able to think about the resilient crop production system that safeguards the natural resource bases. On top of this he added that the lesson they were offered during the HSG exercise is part of the knowledge sharing effort that enable them to have broad insight about the

present and the future in terms of rainwater or land management so as to ensure sustainability of the system. They were largely impressed by the exercise and highly grateful for that.



Figure 13 : a female farmer presenting the work of the women's group

3.6 Discussion

Man and women came up with a very similar landscape. Man's group has have mentioned more practices that are not part of the HGS cards but were adopted in the watershed, suggesting good knowledge of the area. Women seems to have a less good knowledge about the watershed, reflected by the less detailed map and the much longer discussion about the maps. Also they have not mentioned practices that have been adopted but were not in the game. Nonetheless they came up with more non-adopted but suitable practices for the watershed, namely the livestock related practices and the motor pump.

4 Shambu watershed (Oromia)

4.1 Description of the watershed

Shambu watershed is a very interesting watershed as it challenges our understanding of the landscape. It can be split into 3 zone, upland midland and lowland based on altitude. Each of this zone can be considered as a landscape with an upslope midslope and lowslope. The highland area corresponds to our classical landscape where the lowslope is a flatland area with grazing land the midslope has agricultural production around the year thanks to a river diversion, combined with apple trees. The upslope is forest.



Figure 14 : the upland of Shambu watershed with a clear upslope midslope and low slope

The midland has a forested upslope, soil and water conservation on the midslope and no lowslope. The lowland is has an important slope and is mainly sparse forest has no lowslope at the outlet.



Figure 15 : the midland of Shambu watershed, with a clearly forested upslope, soil and water conservation on the midslope and no lowslope

Farmers in the upland, on the midslope have river diversions that allow them to cultivate around the year, especially high value crops during the dry season. We visited a farmer that had apple trees, irrigated all his land through a river diversion, had modern beehives, had a storage room for fodder and collected manure in one place so that he could spread it on his land. This farmer seemed very well educated as he understood the questions in English and answered in Oromo. There is no NGO active in the watershed and all the initiatives taken in this watershed is bottom up, supported by the DA and extension service.



Figure 16: view from the midland onto the lowland (outlet behind the woodlot) in Shambu watershed

Many farmers live in the two settlements Laku and Shambu. Both settlements have access to electricity.

4.2 Discussion from the women's group

4.2.1 Participatory mapping

In a first step, the key informants start to the sketch of mapping by drawing the boundary of the watershed and then after sketching the major river stream found the watershed. As to the approach followed, the group selected one active woman farmer who leading them during the map sketching.



Figure 17 :Women starting the mapping exercise in Shambu

The women groups of farmers have identified in their resource map the upper, mid and the lower streams, the roads (seasonal and whether roads), seasonal rivers (annual rivers), crops land, forest land, degraded land, grazing land by different markers and cards color. During the focus group discussion the participants/ key informants were also asked to include the most relevant institution found the watershed that are engaging in the community development. Accordingly, the village administration, primary school, cooperatives and farmers training center are the major institutions which are role different in the watershed. The women's group started with defining the mountain that are the border of the watershed. Once they agreed on the watershed boundaries, they added the rivers both perennial and non-perennial (blue dotted line) as well as the gravel road (red line) and walking path.



Figure 18 : map of Shambu developed by the women's group

4.2.2 Preferred landscape

The women's group came up with a landscape composed of the practices found in Table 4.

Table 4 : practices proposed by the women's group in Shambu

Practice chosen	Location	Status in the watershed	Intervention
River diversion	Around the perennial river	Adoped	
Motor pump	Around the perennial river where river diversion is not possible	Not adopted	Access to motor pump Access to finances
Soil bunds	On the slope	Adopted	
soil fertility management (crop rotation, intercropping)	Cropland	Adopted	Timely availability of all input (fertilizer, seeds)
Improved seed	Cropland	Not adopted	Timely availability of all input (fertilizer, seeds) Access to credit
Sesbania	Cropland	Adopted	
Well	Upland	Adopted	
Improved breeds	Grazing land		
Apple trees	Midslope	Adopted	
Cut-off drain	Midslope	Adopted	
Limiting animal movement	Grazing land		Community organisation
Area enclosure	Grazing land	Not adopted	Community organization
Cut-and carry system		Not adopted	Community organization

oversowing	Up and mid land	Not adopted	Community organization
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Orchards (Apple and papaya)

On the sketched map farmers allocate/ put the orchards (apple tree and papaya) at the upper side of the watershed. Farmers perceived that the soils on the upper side of the watershed are more suitable for planting apple rather than cultivated for crop production due its high slope/steep. On top of that farmers understood planting apple on sloppy area can reduce high run off the water and increase water infiltration rate. In other word it decreases the soil erosion when the technology is properly planted on the steppe slope of the watershed. Though they have tried to allocate this practice at upper side of the watershed, farmers' majority have not implemented this practice on their farm due to availability of the seed, lack of awareness on benefit of technology and shortage of the financial problems. So any governmental and nongovernmental institutions who are working the area should be taken into account this intervention to reverse this scenario.

River diversion

During the PRA focus group discussion the women group of farmers recommended the river diversion for the lower as well as for midland of the watershed area. Farmers' reasons out that in these two zones of the watershed majority of crop land and several river streams also found there. On top of that the topography of crop land avail in these zones is suitable for irrigation scheme implementation. Farmers mentioned that the irrigation scheme found not is efficiently used by the community and they produce only a few horticultural crops by the existed irrigation scheme. Limited of water availability for irrigation during the winter season and poor maintenance of the schemes are the major constraints faced the farmers.

Gully rehabilitation (Check Dam)

The key informant allocate the gully rehabilitation to the upper and mid land of the watershed where there is series of soil erosion frequently occurred and formed the gully across the crop land and grazing land, due to overgrazing of the land by the livestock and frequently ploughing. The land of the upper side of watershed is more degraded as compared to the mid land of watershed due to high runoff water and overgrazing.



Figure 19 : women playing the “happy strategy”game

Cut off drain

During focus group discussion Farmers choose the cut of drain and allocate for the upper side of the watershed. They justified that at this zone there is high runoff water due to it's the steep slope of the land found in the zone, if the cut off drain properly implemented at this side the erosion of soil minimized for the midland and lower side of watershed.

Grassing land management

Forage grass is one of the most important rain water management practice which manly used by the farmers in the watershed. During the focus group discussion farmers selected and allocated this practice for the **mid land and upper** level of the watershed. This is mainly due to the suitable land availability in these zones. Though, farmers allocated the practices there is shortage in availability of the improved forage technology in the watershed.

In general in order to increase fodder, grassing land management should come with *oversowing, area enclosure, cut and carry system, limiting animal movement*. This grazing land management requires community organization and therefore concerned institution should have to take this issue for intervention.

Soil bund/ Stone

Thanks to the government Ethiopia for the campaign he had made in this year on natural resource management, so that many farmers found in the watershed have started to make stone/soil bund on their farm land. Due to these fact farmers has already aware about this technology and they have easily allocated the practice at the midland and upper level of the watershed. Steep slope nature of the watershed attribute for the allocation of bund for these zones.

Multipurpose tree (Sesbania)

Farmers preferred to choose the multipurpose tree particularly sesbania to allocate in the mid land and lower level of the watershed specifically around their homestead. The reason why the farmers allocated in this area, the tree mainly used forage purpose and fence around the home stead On top of that used for fuel wood and fertility of the land specifically for the cultivated land.



Figure 20 women's group presentation

Improved dairy breed

Before allocate the card, farmers discussed where to allocate the improved dairy breed across the three level of the watershed. Accordingly they allocate this technology to the mid and upper level of the watershed. Farmers reason out at the upper and midland there are ample amount of grazing land which suitable quality type of grass and also easily accessible to the infrastructure like road to buy concentrate feed like Noug cake and to sell dairy products (milks and butter).Farmers living in the upper level of watershed have already adopted improved dairy technology,

However as farmers reported that the milk productivity of this breed have not as such attractive due to limited concentrate feed availability in the area.

Fertility management (Crop rotation, Intercropping)

Farmers allocate this fertility mananagment system (crop rotation and intercropping) for the mid land and lower level of watershed. Farmers justified the reason for the allocation of the practices is suitability of the cultivable land found in these zones. Farmers' practices crop rotation several years and they also know the benefit of this practice but intercropping is not used by the farmers in the watershed. This may be due to lack of awareness on the economic and agronomic benefit of the intercropping practices. The crop productivity is decline from year to year mainly due to dominantly practicing of Mono cropping and land serious soil erosion in the area. Farmers adopted improved cereals crop like tef, wheat, barley and also horticultural crops like potato and apple to improve their livelihood.



Figure 21 : The men following the women's presentation

During the PRA focus group discussion the women farmers identified the rain water management practices which can be suited to the Shambu watershed but still not have been adopted by the farmers due to several socio economic and institutional factors they mentioned. Though the practices were not used by the farmers in the watershed, they have created a desire for the technologies did. If the farmers have got the opportunities to access to the practices

mentioned below they have high demand to adopt it. These are practices like pond, cropping system like intercropping, large scheme irrigation (river diversion), growing improved grass like rodas grass and elephant grass and practicing furrow tillage which has been tried out by few farmers but not yet popularized in the watershed.

Wells

There is one farmer who owns a well near to the grazing land.

Improved seeds

Farmers have also mentioned that they would like to have improved seeds, but they don't have access to them.

4.2.3 Difference with the existing landscape and interventions needed

From the past four or five decade up to the present date there were several rain water management practices have been promoted in this watershed regardless of site- specific biophysical , socio economic and institutional environments. Due to the facts that adoption rate of the rain water management are low. Accordingly, the key informants were asked to mention out the reason for non adoption of the rain water management's practices that could be worked in their agro ecologies. Among, these are lack of awareness, Lack of access to inputs like planting materials (seed/seedlings), lack of cooperation among the farmers, shortage of finance and lack of farm tools are the major factors. Therefore, to sustain the rain water management in the watershed the following mentioned intervention in the table should be needed. These innervations are identified/ recommended by the key informant during the focus group discussion at Gorosole watershed.

No	Type of intervention	Institution should be involved
1	Awareness creation on some rain water management practices through farmers training	<ul style="list-style-type: none"> • Bureau of agriculture • NGOs
2	Farmers organization for collective action like participatory natural resource management (Bond making, area enclosure and	<ul style="list-style-type: none"> • Bureau of agriculture • NGOs, • Research institute

		<ul style="list-style-type: none"> • Cooperatives
3	Provision of credit for purchasing of different farm tools	<ul style="list-style-type: none"> • Bureau of agriculture • NGOs • Oromia Credit and saving company
4	Since majority of the farmers faced shortage of finance to purchase rain water management technology like water pump, provision of water pump in the form credit for group of the farmers very important	<ul style="list-style-type: none"> • Cooperatives • NGOs • Research mechanization institute • Bureau of agriculture
5	Provision of forage and apple seed for the farmers	<ul style="list-style-type: none"> • Bureau of agriculture • NGOs, • Research institute
6	Unavailability of the improved dairy technology	<ul style="list-style-type: none"> • Research Institute • Bureau of agriculture

During the PRA focus group discussion farmers reported that currently the existed watershed/ landscape have been negatively influencing their livelihood. Because the existing natural resource found in the landscape are deteriorated from time to time. In other word the trends of the crop productivity, natural resource conservation particularly (forest, soil and water conservation) and livestock productivity were continuously decline over time. The distribution of rainfall and pattern of rainfall have also changed from time to time. Land degradation also other factor aggravated from year to year due to mono cropping, deforestation and over grazing of the land. These negative trends were made due to the disturbance of the Ecology by the human being.

In the future farmers wish the rain water management technologies that can be changed these scenarios in the landscape. These could be made through properly implementation of the appropriate rain water management technologies in the watershed. Farmers believed that if the appropriate technologies are implemented by different organization, it may increase the crop productivity, the ground water, rainfall pattern, soil and water well conserved and other above mentioned factors could be changed.

4.2.4 Trade-offs

Sometimes it is difficulties to get the practices that can be work across the whole level of the watershed due to socio economic, biophysical and institutional factors and improperly implementation of the rain water management practices for the landscape or lack of integrate among the technologies across the level of watershed. At that time one groups are more benefiting the technology than others group. In other word, the other groups are looser of the technology. Due to the scarcity of these resources the conflict may be existed between the people who are living in the upper side and the lower side of the watershed. For instance in the Gorosole watershed, farmers perceived that if the river diversion is allocated at the midland of the watershed, the lower side may not be benefited much as the upper one due to shortage of the shortage availability of water for the lower group. This may raise the conflict between the farmers. Any intervention rain water management technologies that will be made by governmental and nongovernmental institution in the watershed should be integrated each other.



Figure 22 : women bravely defending their work

4.3 Discussion from the men's group

4.3.1 Participatory mapping

The men's group started by discussing the border of the watershed by discussing the reference points they want to use. They finally started to draw the boundaries from the west, using mountains and settlements as reference points. Later on they added the secondary school. After the boundaries and mountain and settlements were set, they draw the rivers, starting with the perennial ones and then passing to the non-perennial ones. They started with identifying the

forest areas and differentiated between natural forest and planted forest. Then they passed on identifying the degraded land and the causes of degradation. The degradation on the left river bank is mainly due to deforestation, whereas the degradation on the right river banks is erosion mainly due to wrong soil management. Finally they identified grazing land and indicated if it is private or communal grazing land. The private grazing land in the upland seems to be use as communal grazing land.



Figure 23 : farmers starting to map their watershed

During focal group discussion (FGD) farmers clearly sketched out the land coverage of the watershed based on the area coverage and have one main outlet but different tributary to the main river called Lakku River(blue line). The farmers clearly identified the boarder of the watershed by using well know reference points like mountains, farmers' household who are found at the point of watershed boarders through all directions (black line). The group members transparently discuss among each other during mapping exercises and characterization of land resources of the area. They mainly classified the area in to higher, middle and lower altitude on the bases of level of steepness and bio-physical characteristics.

Farmers identified that there is one non-seasonal road (non-asphalt) which directed from Shamboo town to Sekela and one seasonal roads directed to Gitilo, the most upper part of the watershed (red line). Moreover, two main paths (on foot) also cross within the watershed (red dotted line). One crosses the watershed from Sekela to Shambo and from Gitilo to the same town.

Although Lakku River is the main perennial river, there are also nine small tributary (perennial) rivers which flow to the main River and have only one outlet, called chanco. Farmers also identified seasonal tributary rivers which are very common during main seasons. They identified that majority of the rivers in the watershed like Lakku, Deju, Aba ingida, Getahun, homi kuro and Gucho Rivers are potential for river diversions if they are supported by any organization in terms of technical and financial aspects. Settlement (around Shambo town and lakku village are commonly settled) and land use/cover were also denoted on the map by heartfelt participation and relative precision to the best of their knowledge.

FGD- members also classified the land in to cultivated land, grazing land, degraded land and both plantation and natural forest land. According to their classification, majority of the land is allocated for crops in all zones though high percentage of the farm is found in the middle parts of the watershed. There is common and private grazing lands which found at the upper (shifted from forest land to grazing land due to over grazing and deforestation) and along river side. Farmers complained among one another on the issue of common grazing land. Farmers who have enough land have equal write to use common grazing with others who have very limited crop land that cannot allocated for private grazing land. Because of such fact occasional conflict was raised due to competition on common grazing land. They also categorized some parts of the area, particularly along river side, to degraded land due to continuous deforestation and intensive cultivation.



Figure 24 Men discussing and placing their cards on the map



Figure 25 : map of Shambu developed by the men's group

4.3.2 Preferred landscape

The facilitators explained for the members about rain water managements before starting discussion with them. All most all farmers aware about rain water managements options like soil and stone bunds, river diversion, ponds, wells, cut-off drains, cut and carry system, use of multipurpose trees, gully rehabilitations, uses of improved breeds of livestock, poultry production, Area closure, conservation tillage (residue managements), different fruit production (like Apple), Motor Pump and live fence as contour planting. The inhabitant farmers have got training and experience largely from development agents, agricultural experts from district office and even NGO's. From this set of card were selected the happy strategy game.

The farmers then selected and allocated cards both for their innovation and from existing practices found in the cards. One farmers selected improve breeds of poultry production as the innovation since it is easy to intensify on small plot of land and need less amount of initial capital. According to the farmer, poultry production is suitable in the middle parts of the watershed as it has suitable weather condition. He described his reason of selection that this technology definitely ensures income generation, particularly households who have no enough land to produce their annual food requirements so that deforestation for charcoal production to sell and even migration for search of crops land is certainly hampered. To this effect, the farmers need improved breeds and materials, like incubators as per union, technical and financial supports. The farmers also much impressed that limited access to improved breeds of livestock and seeds, particularly wheat, barley, beans and Linseeds are their major demands that have to be in consideration. Because of this fact, farmers practice overstocking of livestock that leads to the main overgrazing problems resulting high acceleration of soil erosion.

As playing strategy game was continued, practices like highland fruit (apple), cut off drain, check dam, contour hedge/life fence, conservation agriculture (residue managements), ponds, motor pump, cut and carry system, area closure, stone/soil bund, wells and over sowing on crop land (innovation) were initially chosen and allocated by the farmers to the respective zones of watershed where the benefit can be obtained and if the inhabitant famers properly implemented the practices at each allocated sites.

The selected technologies and purpose (suitability, benefits and interaction) are the following :

Highland fruit (Apple):

Even though some farmers practice apple productions in the watershed area, a farmer again choose this high value crop mostly for midland and even for upper land if there is good soil condition, soil depth. His justification is that agro ecology is ideal for growing apple. Besides, access to irrigation water and mulching practices are also another opportunities in order to grow the crop efficiently. However, demand of planting material (seedling), supply of different improved varieties, strong market linkages are the main focuses which they need supports from any organization.



Figure 26 : a farmer studying a card carefully

Contour hedge (life fence):

Multipurpose trees (MPTs) particularly vernonia, Sesbania(but not common) and other bush types, which are characterized by co-friendly with crops, are considered as life fence/hedge rows. Such plantation is common everywhere in the watershed around the homestead. MPTs were introduced by, though not common, DAs and agricultural experts from woreda office. They indicated that such types of trees are used for animal feeds; improve soil fertility, life fence, for construction and even for wind breaks.

Conservation Agriculture (Residue Management)

Conservation agriculture is also mainly selected and even practiced in the middle and lower parts of the watershed. They want to practice particularly on degraded land because of its multi beneficial aspects, which improve more soil organic matter of degraded land, improve soil fertility and crop productivity, reduce runoff & Improve soil water retention capacity. However, high competitions of residues by the livestock are the main bottle neck to ensure sustainable residue incorporation in the area. The farmer forwarded his attitude as the main solution is diversion of overstocking livestock production to cut and carry systems using improved breeds and intensification of poultry industry reduce residue competitions. As far as CA improves soil moisture and fertility, the contribution of this practice for other technologies, like fruit and feed production, is that it ensures production and productivity of both livestock and crops in the watershed.

Stone/soil bund:

Both stone and soil bunds were started to be practiced during the derg regime though not sustainably practiced as observed from farmer's witness. Currently, however, soil bund targeting the degraded and largely steep areas have been implemented on the upper and along some river sides of the watershed. However, it was not technically good as we have observed during transecting walk.

Cut off drains:

Cut off drain is largely recommended by the farmers for the upper level or steep slope areas where erosion makes its start and increase its acceleration to middle and low slope areas. Most of the resident farmers who are living in the upper stream are conventionally practicing to reduce erosion control. They believe that cut off drain significantly reduce and save the soil bio-physical characteristics since it control the impact of soil erosion. However, they need further technical supports to construct effectively.

Motor Pump:

The farmer preferred this technology to adopt in the lower parts of watershed areas since there are potential rivers (e.g. Lakku River) used for irrigation. He preferred motor pump as a solution

to use the river for irrigation because of nature of the river, which found in deep valley and difficult to divert, and hence motor pump is applicable and economically cost effective. However, the farmers need both technical and financial supports for effective utilization of the technology.

Ponds

According to the participants, it is suitable in middle parts of the watershed since it is easy to capture run-off and for irrigation purposes. Though the farmers know the technology, they did not so far practice in the watershed due to limited awareness and lack of materials, financial problems and even no technical supports. To this effect, they need training, financial sources and any technical support for the construction of the pond.

Check-dam:

As per farmers' suggestion, erosion is a series and sever problem in the middle part since its acceleration increase downwards and hence seriously eroded the upper soil of croplands. Therefore, they prefer check dam to implement in the middle parts. According to the respondents, checkdam effectively reduce speed of soil water erosion, improve soil fertility and increase infiltration rates. This technology has also positive interaction effects for the others, particularly fruit production, increase biomass of feeds, increase spring sources, and hence enhance water availability in the watershed. Some of the farmers explained their witness that they have been constructing along gully formed areas using woods (woodlot check dam). However, they need additional technical supports and inputs used for construction of the check dam.

Poultry farming

Famers suggested that increasing their amount of chicken, would allow them to get good additional income. This income would allow them to overcome the losses of livestock needed for decreasing the pressure on the land. Destocking would be much easier.

Wells

The farmers also preferred this technology to implement in middle parts of the watershed areas since there is potential availability of underground water and will be found with 12-15 meter depth. He listed out its benefits as it used for production fruits and vegetable crops, produce seedlings of MPT's, used for drinks for animals and bees and even for household purposes.



Figure 27 : The poultry innovation card

Over sowing improved forage crops on crop land

Though some participants who do not have enough crop land reserved themselves, sowing of improved forage varieties on cultivated land is one of the main solutions to reduce shortage of animal feeds. It is suitable in every watershed areas around the homesteads and on good soil fertility so that it is easy to protect from animals. However, the farmers did not get enough improved forage varieties for intensive productions in the watershed. Both financial and technical supports are their main questions to be addressed through any organizations, probably government and non-governments.

Area closure

This technology is also preferred by the participants in some spot areas, particularly in the upper mountain where bushes are very common, and where diversity of trees and bushes can be regenerated if protected very well. The participants regretted on their previous deforestation practices on natural forest resulted land degradation and even leads to climate variability. Due these consequences, they are eager to close the areas (upper parts) where bushes are very common. They also need to interplant fast growing trees in the closed areas though there is limited access to such trees.

Table 5 : practices proposed by the men's group in Shambu

Practice chosen	Location	Status in the watershed	Intervention
Bunds	Midslope	Adopted	
River diversion	Around the perennial river	Adopted	
Motor pump	Around the river where diversion is not possible	Not adopted	Access to finances
Well	Upland, lowslope	Adopted	
Check dam/ gully rehabilitation	Degraded land	Adopted	
Area enclosure	In the planted forest, lowlands	In process	
Cut and carry livestock system	The whole watershed to protect the grazing land	Simultaneously with the area enclosure.	
Apple trees	Upslope, midslope	Adopted	Improve output market access Access to seedlings
Mulching	Everywhere but mainly combined with apple trees	Adopted	
Contour planting	Cropland	Adopted	
Improved livestock breeds	Grassland	Adopted but could be more	Access to more cross breed livestock
Oversowing	Grassland	Not adopted	Access to forage seed
Oversowing on cropland border	Cropland	Not adopted	Access to forage seeds

Poultry farming (=20 chicken per farm)	Midland	Not adopted	Access to incubator or one day chicken
Improved varieties of wheat and barley	Cropland	Not adopted	Access to improved seed

The resident farmers have been implanting some rain water management options like, river diversion, apple production, conservation tillage (residue incorporation), both soil and stone bunds, wells, gully rehabilitation, improved breeds of livestock, fertility managements (crop rotation and fertilizer application). Farmers have got training and technical supports mainly from development agents, agricultural experts from woreda office and even NGO's

4.3.3 Difference with the existing landscape and interventions needed

According to the farmers, the current existing bio-physical characteristics of the watershed have been gradually degraded and leading to the negative consequences. Most of the crop lands are less productive, overgrazing and deforestation of the natural forest are also caused the main soil degradation problems. Farmers' previous experience compared with natural existing of past three decades indicated that there were dense natural forest and the nature of the soil was also very productive. But now, it is declining with high alarming rates due to their miss- management and utilization process. Consequently, less production per unit area, continuous soil erosions, shortage of animal feeds due to shortage of land, high variability of rain fall are currently observed in the watershed.



Figure 28 : men's group presentation

However, farmers predict future consequences of the watershed landscape if all selected water management options are implemented in each watershed area. High production and productivity, improved feed availability and hence high livestock productivity, ensure sustainable land

resource managements, more forest cover will be the positive effect if all selected components are practiced at each selected site. One farmer said his slogan in afan oromo that ‘wanti filatame hundi yoo hojjetame biyyi keenya biyya magariisaa taati!’ meaning that if all selected technologies are implemented our country become green. Their prediction become real if integrated rain water managements are done to the existing systems.

Though farmers in Lakku watershed are familiar to some various rain water management practices, there is also another management option which was not so far practiced. The resident farmers are still seeking unpracticed management options like over sowing of improved forage crops, area closure, cut and carry systems, motor pump and ponds. Lack of collective action, particularly for river diversion and motor pump is the main important issue that should be in considered by government or non-government or any institution who help in formation and promotion of cooperative works. Also diversifying into poultry seems an interesting option to them.



Figure 29 : women listening to the men’s group presentation

4.3.4 Trade-offs

According to the participants, there were two contrasting ideas on the issue of winners and loser (trade-off). Some group explained that if all allocated technologies are well practiced in each watershed slope, farmers who are living in lower area are more benefited than the upper ones. They believe that water availability and soil fertility is improved in lower altitude than the upper land so that the productivity of land improved and hence income generation is increased. In contrast to this, however, some farmers believe that if all selected practices are well done in integrated approaches and properly implemented every farmer living in different altitudes of the watershed will become equally benefited. As a general conclusion, majority of the farmers

become beneficiaries if all integrated water management is successfully implemented in each watershed part. The participants also suggested that if the proposed practices are not implemented in a very good manner, all farmers living in the watershed are also similarly losers since deforestation (in upper parts), soil erosion and gully formation (middle and lower parts) and overflows and siltation(in the lower parts) are become aggravated.

4.4 Comparison with the first version of suitability maps

The N3 maps in Shambu woreda, perform relatively badly. The only prediction for this area are all types of bunds (soil, stone and fanya-juu). The map do not predict apple trees, suggesting that the suitability for apple trees have to be reviewed. Also no river diversion are predicted, because the river map used does not indicated any perennial river in the whole district.

4.5 Final mixt discussion

At the end of our focal group discussions, we have given chance to explain their views about their general observations of the day. They generally compared the real existing feature of landscape with last three decades. Unwise land use systems due to their activities resulted unproductive lands, deforestations and uncertain rainfall occurrences. They trusted that if they implement all integrated rain water management in the watershed, feature of land resource become recovered and productive. Hence, this country could only develop if and only if there is optimum utilization of natural resources while maintaining for the next generation. Finally, the participants promised to teach their neighbors what they have learned during the strategy game.

4.6 General impressions and lessons learnt

The women's group faced difficulties in mapping the watershed, and the mapping was mainly taken over by the DA. The women were therefore kept less active, something that has been addressed explicitly in the Amhara focus groups. The male group was a great success. The group of farmers seems to have really enjoyed the exercise and was very happy that they were selected. They also came up with creative solution and were very keen on learning from us. They wanted to know what we think of their ideas and see what they can learn from us. This is a community where we really have to go back with the results.

5 Maksenit watershed (Gonder, Amhara)

5.1 Description of the watershed

Maksenit watershed with its 6000 ha is the biggest watershed we are working in and lies at the border o Maksenit town (South East of Gondar town). It is also one of the driest watershed we look at, with 700-800 mm rainfall annually. Its structure is complex, as it is formed by several micro-catchments.



Figure 30: the maksenit landscape seen towards the west

In the highland, two range of mountains covered with shrubs can be found. There is as such no or very little midland, but a huge lowland plain. The two mountain ranges make the border of the watershed complex, and therefore only expert eyes can recognize the borders of the watershed by watching the landscape. Only the lowland is cultivated mainly with rainfed system.

Nearer to the outlet around the perennial rivers, river diversions can be found allowing for double cropping and chat plantation. In other locations around the river the topography does not really allow for diversion. In these locations sometimes farmer irrigate with motor pumps. One farmer has a pump and rents it out to the others. Also river diversions can be found near to the non-perennial rivers. These allow to irrigate the plots long enough to have two or three cropping season. The cash crop is mainly garlic during the dry season. As the plain is mainly vertisols and therefore keeps soils moisture well, sometimes after the main crop, farmers manage to grow peas on the residual moisture. In the non-perennial rivers, micro reservoir are built in the river bed to

capture some water. Also wells can be found in these river bed, allowing to capture the underground streams of the rivers.



Figure 31 : view towards the outlet

We also met a very rich female headed household, who was building a house in Maksenit for rental purposes. This household own 4 hectare of which one is in the lowland and is irrigated the whole year round. The major income comes from garlic, but also honey and from the some mobile tree nursery. GIZ build for this household a cement cistern to collect water from the roof. Unfortunately, the cistern leaks, even after several attempts to repair.



Figure 32 : the leaking GIZ cistern

On what could be recognized as midland, one farmer had a papaya orchard. Mango is not suitable because it gets attacked by termites. Also in this midland, we found a nursery for pepper. The farmers carry the water for about half a kilometer from a small reservoir in the river bed.



Figure 33 : the ICARDA water ponds

In this watershed, ICARDA is active. Five model farmers have received a rainwater harvesting pond. One farmer even got a treadle pump and a drip irrigation system. With this he can irrigate a plot of 30x18 m during the dry season and overcome dry spells with supplemental irrigation. Another farmer uses a simple bucket to irrigate during the dry season from the ponds. After one year only his income has increased significantly. Also ICARDA has built measurement gauges and assess the sediments of a treated and an untreated micro-catchment. Finally ICARDA installed a treadle pump in near the bed the non-perennial river, allowing to access water of the underground stream easily for domestic use.

On the way to the outlet, but outside the watershed, there is a state run tree nursery that grows multipurpose trees and gives the seedlings away for free. Many farmers though have small mobile tree nurseries, where they grow their own tree seedlings. We also found a private tree nursery that was attacked by termites and all the work was lost.

5.2 Discussion from the women's group

5.2.1 Participatory mapping

The sources and sub water sheds of both kebeles are discussed & identified.

According to the participants of FGDs Bisnit, Welenbay, Chemena and Ayaye are subwater sheds in Dinzaz kebele. But Ayaye watershed is bordered to both Degola chinchaye & Das Dinzaz kebeles.



Figure 34 : women placing the “land use” color papers in Maksenit

In Degola chinchaye the following rivers:

Aba kaloye, Agamge (which later join Addisge), Addisge, Enkre and Chika wonz flows to the outlet of Gumara River.

At the same time during the drawing of map process the following are marked:

- Rivers (all season and rainy season)
- Outlet
- Roads
- Churches & schools

- Forest
- Grazing lands
- Degraded lands



Figure 35 : women during the mapping exercise

A woman which draws the map were criticized her parents who send her for marriage instead of sending her to higher school level. She draws well but still wishes to do a very best.



Figure 36 : a woman using a glue for the first time in her life

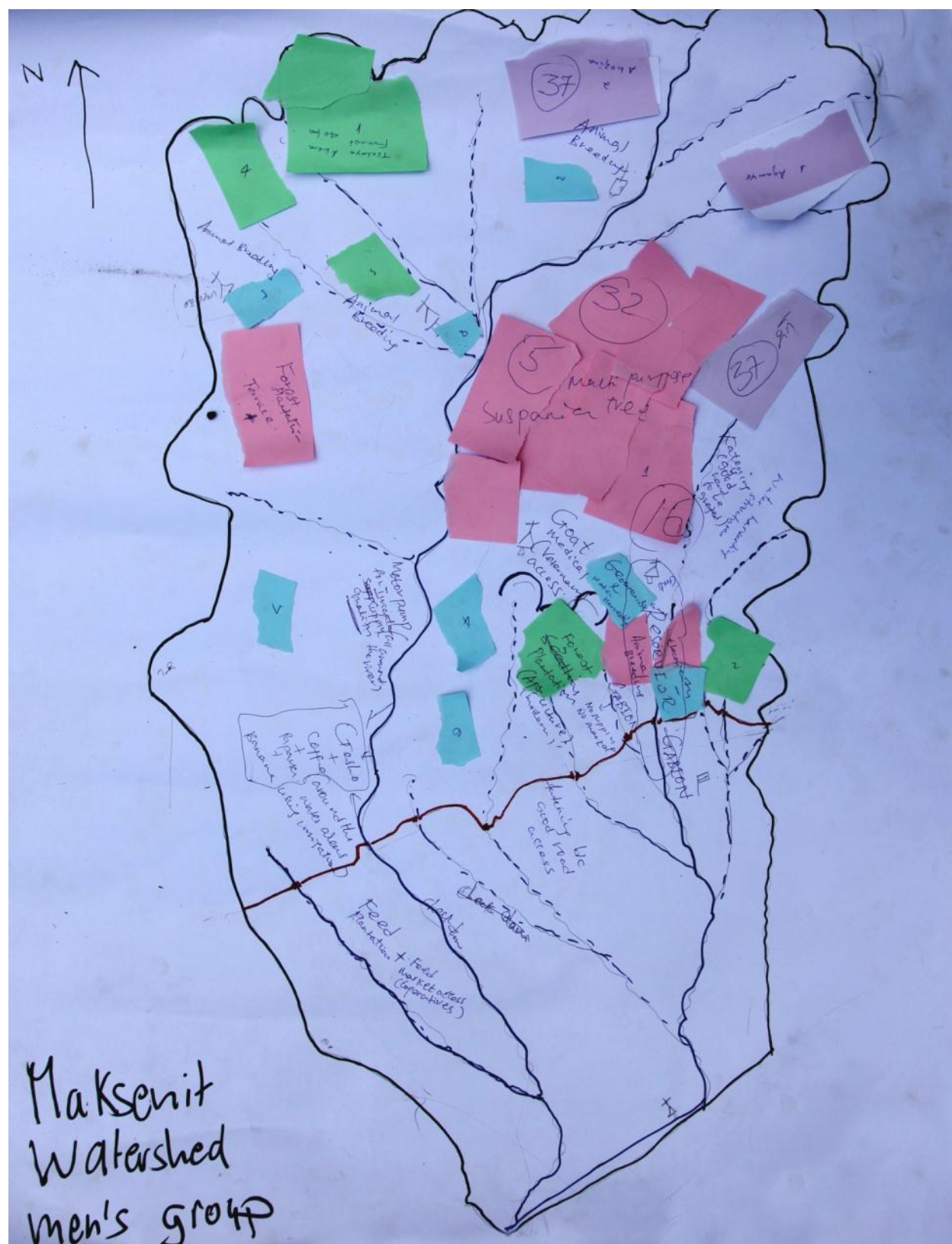


Figure 37 : map of Maksenit developed by the women's group

5.2.2 Preferred landscape

The farmer came up with the following preferred landscape :

Practice chosen	Location	Status in the watershed	Intervention
Improved livestock breeds		Not adopted	Lack of funds
Motor pump	Around river and sources	Adopted but not by all	Lack of funds
Hillside terraces	Midslope	Adopted but not always properly	
Pond	Lowslope	Adopted by not by all who wish	Lack of knowledge and funds
Improved nutrient input	Everywhere	Not adopted	Lack of awareness, lack of labor lack of money and credit (inorganic fertilizer)
Bunds	Midslope	Adopted	
Spate irrigation	Near to seasonal rivers	Adopted	
Afforestation	Hills	Not adopted	
Home garden	Around settlements	Adopted by not by all who wish	Lack of access to water during the dry season
Water tanker	Around settlement	Adopted by not by all who wish	
Hand dug wells	Around settlements	Adopted by not by all who wish	
Beehives	Around home gardens	Adpted but not sufficiently	Lack of flowering trees, needs to be combined with home garden.

Improved livestock breeds: Through this intervention I can get better livestock production and better animal products (milk, meat, etc). I know the technology but do not have money to use it. The second women also choose it and the reason is to have better animal production and animal products.

Motor pump: My husband was died and I live with my young children's. We moved to the new village area which is located by the riverside. There is enough water and would like to use it. If I get a motor pump I can work with it. But no money to put into practice. The second women also choose the same but her reason is her land is uphill and can't divert the river. Her best choice is motor pump to take the water up and to be more productive.

Hillside terraces: It is very important at the top of watershed. The reason to choose is to recover forest, recharge ground water, improves soil nature, increase yield and to increase cash income. Due to lack of awareness were not done properly.

Pond: I don't have water but if I get pond water around can plant vegetables and get cash income for myself and my family. I can plant also flower trees for my bees by using water pond. Both plants and animals can use the water. Due to lack of awareness and labor cannot do it. The other woman also chooses to plant pepper, vegetables etc but there is shortage of water resources.



Figure 38 : women playing the happy strategy game in Maksenit

Improved soil nutrient input (organic and inorganic fertilizer): They use both methods and mentioned its uses like to increase crop production, improve livestock feed, improve human feed

etc. But they believe that organic compost is very useful in the long run. The reasons why not use it very widely are lack of awareness, no credit service, lack of labour and due to less number of animals. But one woman said that I have no animals at home but am still using home waste and residues for organic compost.

Bunds: uses for soil conservation, keeps water resources, improve crop production.

Flood diversion (spate irrigation): It increases crop production, increase cash income. We can plant vegetables (like onion, potato, etc...), Crops like barley, Chick pea and others. Therefore we can have production of 3 times in a year.

Afforestation: Would be needed to recover degraded lands of Degola and Enkre Medhane Alem but did not happen yet

Home garden: they refer to home gardens to lowland orchards (papaya, coffee, gesho, ...) combined with pepper. These gardens can be a cash income especially for women's and of course for the family. Lack of water is referred as a reason why they don't have more home gardens. They should therefore be combined with other practices that gives access to water during the dry season, namely wells or ponds..

Water tanker, hand dug wells and pond construction: These technologies are adopted by some but not enough. As there is no much water resources around. Most of us are carrying water from very far away of distance. Women's are always staying around their homes and if we get water we can plant vegetables, fruits, etc... and get a number of uses out of it.

Fattening: it would help them us to get additional income but it is difficult to get improved breeds mainly because of the lack of funds and credit opportunities.

Beehives: We all have traditional Ethiopian beehives but we need the modern bee keeping technology , planting flowering trees and vegetables around as well as having sufficient water resources are necessary for keeping honey bees. This practice should be combined with the home gardens.

5.2.3 Difference with the existing landscape and interventions needed

Women mainly focused on what happens around their house. They wish to have more home gardens that allow them to feed their families on diversified food and get some additional income. With the home gardens, which have more flowers, they could have beehives and more income. The bottle neck of their perfect landscape is the access to water during the dry season and therefore linked to any water harvesting technology such as ponds and tanks as well a wells and motor pumps (to access water from perennial rivers or from the wells).

5.2.4 Discussed Trade-off

The water comes from upland and upstream are more water users and downstream were affected. In this watershed case Enkri Got (Upstream) have been more users than Aba Kaloye Got (Downstream). The solution which is made by the got judge is to use water in shift basis. Therefore the decision by the kebele judge reduces conflict and makes both users.

The water amount is very small to increase technologies/practices.



Figure 39 : women's presentation

5.3 Discussion from the men's group

5.3.1 Participatory mapping

Where to start drawing map of the watershed was a central point among the group members. Finally they started from the outlet and went to North by the East side and turned back to the outlet again to the West direction. They tried their best to delineate the boundary and incorporate

most of the watershed parts. The main road crossing the watershed helped them to manage their drawings. They first put the fords on the relatively exact place along the road before drawing the rivers. The nine fords were very helpful to draw the rivers and manage the connection distance between the rivers crossing the watershed. They put major features like churches, settlements and schools in the watershed. Generally, the members' visualization and interaction was astonishing.

There are natural forests scattered mainly in the upper part of the watershed. Main forest areas raised during the time were namely **Tsehay** forest (State), **Belew Seged** forest (Communal and enclosed in 2010), **Kulkuwal** forest (Communal and enclosed in 2010), **Tila** forest (Private), **Agmas** forest (State). The forests are mainly composed of similar tree/shrub species like *Olea europaea* (Woyira), *Albizia gumifera* (Kachona), *Dodonea angustifolia* (Kitkita), *Carissa edulis* (Agam), *Rhus glutinosa* (Embus), etc.

There are also degraded lands in the watershed. These land covers are owned by the community and concentrated in the central part of the watershed. Deforestation was the main responsible for the degradation indicated by the focus group. Actually there are few scattered farmlands in those land covers still being tilled though not productive enough. Free grazing is the main feature of degraded lands in the watershed. A couple of these land covers are being enclosed since 2010 for restoration and rehabilitation. Enrichment through tree planting is also being undertaken for the enclosed ones.

Grazing lands are another major land cover of the watershed. There are remnant trees scattered over the grazing fields. These are situated in the upper part of the watershed called **Agamye** and **Abozina**. Cattle herds coming from inside and outside the watershed do freely graze in these areas. Its degradation level is somehow moderate due to its less accessible by people around the area.

The rest part of the watershed is covered by agricultural fields and settlement areas especially from middle to the lower part of the watershed.

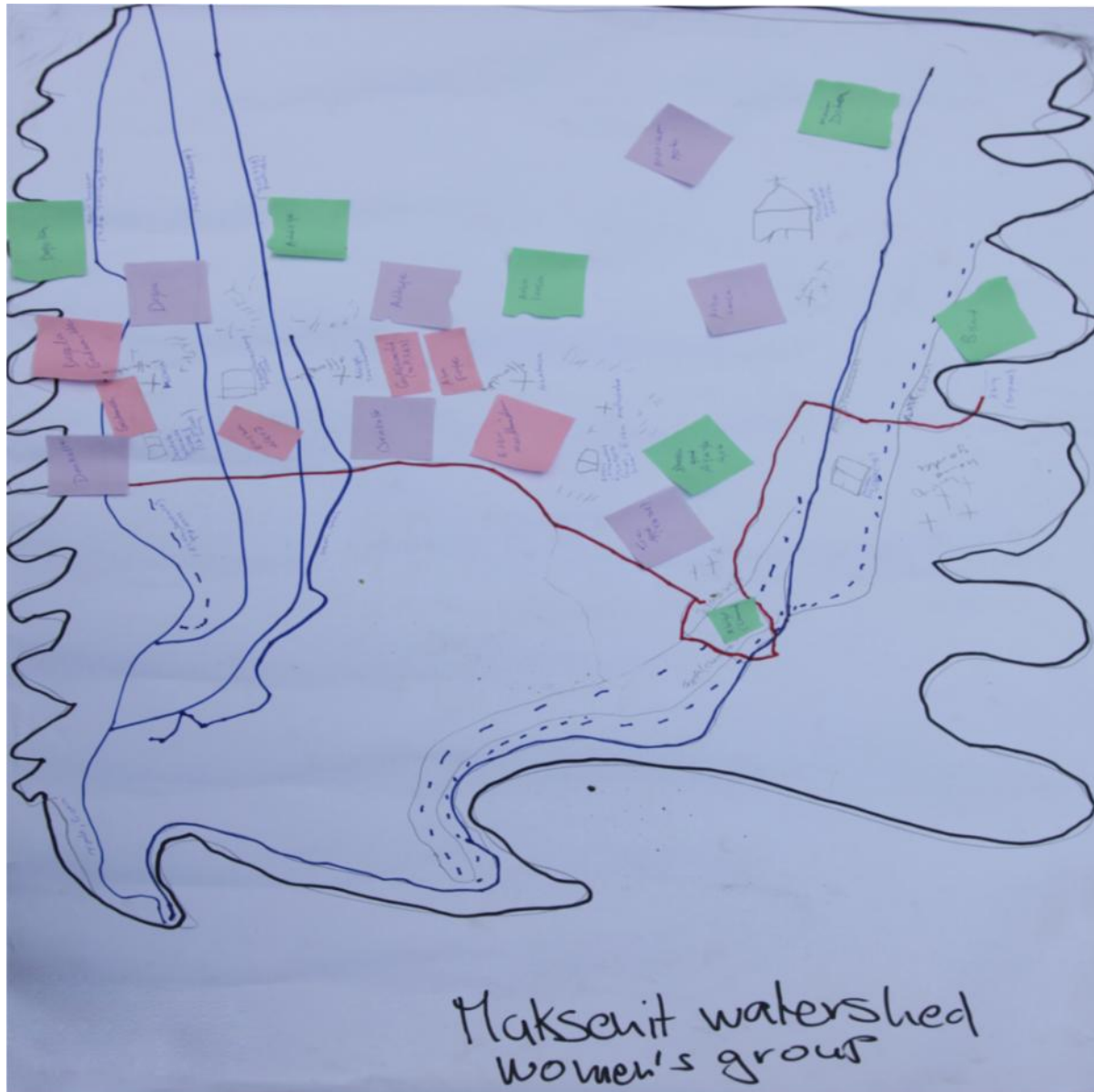


Figure 40 : map of Maksenit developed by the men's group

5.3.2 Preferred landscape

Practice chosen	Location	Status in the watershed	Intervention
Stone terraces	Mountain/hillside	Adopted	Campaign 2004
Area closure	Degraded land	Adopted in some area but should be more in the uppland	
Diversion	Outlet	adopted	

Motor pump	Around rivers	Adopted but difficult to maintain	Access to good quality pump
Compost	Crop land	Adopted	
Improved livestock breeds		Adopted for cows	Access to improved goat and sheep breeds
Multipurpose trees	Cropland	Adopted	
Eucalyptus woodlot	Cropland	Adopted	
Hand dug wells		Adopted but not suitable where stone bed is too near to the surface	
Water harvesting ponds	Midland	Adopted	ICARDA program
Large scale irrigation scheme	Lowland	Not adopted	Lack of funds
Gully rehabilitation	Degraded land	Not adopted (in concrete)	Lack of funds
Apiculture	Crop land	Not adopted	Lack of trees, lack of tree nursery
Orchard (lowland fruits)	Crop land	Not sufficiently adopted	Lack of seedlings
Small poultry farming	Crop land	Not adopted	Lack of efficient disease management, medications
Mill services		Not adopted	Access to electricity

Stone terraces along the mountain and hill sides has constructed through campaign as of 2004 offseason.

Two degraded *areas are enclosed* since 2012 for rehabilitation. Tree planting has been planted as a means of enrichment. There are also different soil and water conserving structures like micro-

basins constructed on the top of newly planted seedlings. The community is also preparing to enclose other degraded areas. Because, the people started to observe the multiple benefits of keeping off the animals and human beings.

Irrigation practice is expanding from time to time using *diversions*.

Around 37 farmers are using *motor pumps*. But they raised the recurrent failures of the motors as serious problem encountered. As a result the maintenance cost is high. They wish durable water pump motors to be delivered. Group members indicated bureau of agriculture should take the responsibility for the delivery of durable ones.



Figure 41 : men during the mapping exercise in Maksenit

Organic fertilizers like *compost* are being practiced by farmers.

Improved livestock breeds : Holstein fresian and Jersy breeds are introduced by bureau of agriculture for the improvement of dairy production of the watershed. Goat and sheep production and fattening are common practices of the watershed community. Improved variety, disease resistant species and medication gaps are expected to be bridged by bureau of agriculture and research institutions.

Multipurpose tree/shrub and grass species used as feed, soil and water conservation are being exercised. *Ficus thonningii*, *Sesbania sesban*, Elephant grass, cow pea are indicated by the focus group members. Lack of seedling provision is a bottleneck problem for the development. This multipurpose tree/shrub/grass species plantation is put as a solution for grazing land shortages. So bureau of agriculture is the responsible body indicated by the farmers for the provision of seedlings.

Wood lot mainly composed of Eucalyptus species due to its fast growth and high value is a common practice being exercised by the watershed community.

Area closure of degraded areas is started as of 2012. Due to the good results observed, the focus group recommended to adopt the practice in the upper part of the watershed.

Hand dug wells are present in the watershed. But the infrastructure is not enough to support the people and livestock in the watershed. To increase the number of hand dug wells the people is facing a problem. The rock bed is too near. As a result the dug well dry out before the supposed time. Technologies able to penetrate bed rocks should be used to have water wells producing year round. The focus group pointed at government to fill the gap.

Water harvesting structures for supplementary irrigation is introduced by ICARDA and being implemented. The focus group assured the presence of huge interest to expand the practice. The expensiveness (a single geo-membrane cost of geo-membrane hindered the community to take over the practice. Availing credit service or providing the geo-membrane with low cost is suggested to be filled by the government.

Large scale irrigation scheme is a desired practice by the focus group farmers. Constructing a reservoir around the middle of the watershed is suggested as an intervention. There is a large amount of command area down there. Its expensiveness to construct is a major problem. Government, NGOs and projects like ICARDA are listed to fill the gap.

Gully restoration in the watershed is considered as a mandatory practice while not done so far. Cemented and gabion enforced check-dams in the gullies is wished by the focus group as intervention. But due to lack of capacity to afford cement and gabion, they couldn't construct the aforementioned type of check-dams so as to conserve the running soil and water and making the area productive. The farmers passed the responsibility to government to furnish those materials with low cost.

The focus group recommended *apiculture* to be practiced in the watershed. The community didn't adopt the technology due to continuing deforestations and introduction of herbicides. Enclosure, nursery establishment and manual and/or mechanical weeding are suggested interventions to be promoted by the bureau of agriculture in the watershed.

Papaya, Banana, Mango, Orange, Coffee productions are the wished practices. Though a big interest and potential, lack of seedling provision, water and termite problem accounted for not

implemented by the community. Nursery establishment to produce the above plants by bureau of agriculture and developmental projects is suggested as an intervention.

Small poultry farms at household level are wished by the group members. Diseases and lack of medications are the hindering factors. The group recommended delivery of such services by bureau of agriculture. Making the service readily available for the community by the government is proposed as intervention.



Figure 42 : getting introduced to the happy strategy game in Maksenit

Mill services for grain in the watershed are wished by the farmers. Now they need to go to town. Electricity is needed as an intervention for the mill. Government is the responsible body for the intervention suggested by the group. As such a mill is not a rainwater management practice but was mentioned by the community.

5.3.3 Difference with the existing landscape and interventions needed

The men's group came up with a certain amount of practices that are not yet adopted but they wish to have. Most of them are relatively big infrastructure for which the government or NGO's needs to be involved, such as large scale irrigation schemes or gully stabilization with concrete check dams. Obviously the ICARDA experience shows them that it is possible to dream big.

Despite of this modern bee hives can be found in the watershed, apiculture seems to be underdeveloped due to the lack of flowering trees. Also farmer indicate that they lack in seedling for those tree, despite of the relative proximity to the governmental nursery, suggesting that the nursery does not produce the trees wished, or that the farmers are not aware of the tree nursery.

Farmers would like to have more hand dug wells, and also dig some new wells but face the challenge to reach the water. Evidence of this can be found in the landscape where whole have been filled with earth can be found.

5.3.4 Trade-off discussed

There are a prospected winners and losers when the optimal watershed gets realized. Using of herbicides would be forbidden when culturing of bees get started. So farmers who wish to use herbicides will go to be losers. Honey producer farmers will also be favored.

Enclosing a proposed degraded to be restored/rehabilitated would offend a nearby farmers. These neighboring farmers used to send their cattle to those places to spend the day time. So when enclosure effected, these farmers would be obliged to keep their cattle off the place. Such upset could be considered as a loss whereas the vast community would benefit from the restoration of the areas and be considered as winners.

The focus group recommended area closure around Agamye area. The people who were collecting fuel wood do lose due to the enclosure. The largest Agamye area and of course the watershed community generally do benefit from the intervention recommended.

5.4 Final mixt discussion

The mixed discussion was relatively short, because the focus group discussion took a very long time and everyone was tired. Each group presented its work and then the group slit up.



Figure 43 : listening to the women's presentation

5.5 General impressions and lessons learnt

In the Maksenit watershed the participatory mapping exercise worked very well. Based on the Oromia experience where women were rather inactive, in Maksenit women drew the map and pasted land use stickers, despite of the fact that initially they complained that they could not go to school and do not know how to do these things. At the end it seemed that they have really enjoyed the exercise and their yet undiscovered capacity to glue paper!

In terms of selection of practices female farmers seemed to be very individualistic following their own interests rather than representing their community. Each woman wanted to have a pump on her specific farm, rather than discussing that this community needs more pumps around the rivers, and to discuss other options for the community. It seems that with the ICARDA experience this community has just learnt to ask for things rather than develop an optimal landscape. But this could also be the results from the facilitation.



Figure 44 : men's presentation in Maksenit

Also the happy strategy game, did not work very well, probably due to the lack of training of the facilitator, who found it difficult to handle the cards. The male group finally went through the discussion without using the cards. The necessary data was collected, but it took much longer time to go through the wished landscape, and participants seemed to have much less fun than participants in Oromia.

An interesting fact is that most of the farmers in this watershed make their livelihoods from garlic, which is irrigated through a traditional river diversion scheme near to the outlet. Farmer

has not mentioned this at all. This might be the result from not being able to play the happy strategy game correctly.



Figure 45: The note-taker, keeping track of the discussion

6 Zefie watershed (Debre Tabor, Amhara)

6.1 Description of the watershed

Zefie is located some kilometers away from Gassay, near Debre Tabor. It is the smallest watershed we have looked at. It consists of only one clear and relatively steep slope where the upland is also the upslope, the midland the midslope and the lowland the lowslope.



Figure 46 : Zefie watershed

It is a well-managed watershed, where terraces and bunds can be found with right spacing and direction on farmers' private land and built with own labor (no mass mobilization).



Figure 47 : Terraces in Zefie

Also most of the gullies are rehabilitated. They are private land and often are the natural boundaries of the farms. The lowland is mainly grazing land and a tree nursery run by the NGO Tana-Beles. This NGO has also recently introduced apple trees in the area.



Figure 48 : the tree nursery at the outlet

Major crops: Triticale, Potato, Barley, Faba beans, Field peas, Flax, and chickpea.

Livestock: Cattle, Sheep, Goats, equines (mainly horse, donkey and mule) and chickens.



Figure 49 : a rehabilitated gully



Figure 50 : a pepper field irrigated thanks to a well.

6.2 Discussion from the women's group

6.2.1 Participatory mapping



Figure 51 : map of Zefie watershed developed by the women's group

The sources of watersheds and sub-water sheds of Zefie watershed site have been discussed & identified. According to the participants of FGDs Ensefere (the source), Enkoko Godir (Got), Tilik Meda (Got) and Enbes Mender (Got) are sub-water sheds in Zefie which flows to the outlet of Gumara River through Ganido valley.

Then the mapping process started by marking the following:

- Rivers (all season and rainy season)
- Villages
- Grazing lands
- Degraded lands
- Forests
- Cultivated lands (Crops)
- Outlets



Figure 52 : mapping exercise in the women's group in Zefie

6.2.2 Preferred landscape

For their preferred landscape the farmers came up with the following practices.

Grass strips along contour: The woman who selects this practice mentioned that they use it as a border which makes less conflict on border issue and good animal feed. It is a new practice introducing by Ministry of Agriculture. She suggests it is a very important process and they want to have more of it.

Bunds: The use of bunds is for soil conservation. It is implemented by Ministry of Agriculture and is not enough, therefore we want to work more.

Limiting animal movement: We use cut and carry system for our animals feed. The practice has been using for many years and we have trained from the family. We need to improve it in a better way due to shortage of farming and grazing lands.

Hillside terraces: It improves our soil conservation and crop production. The practice is implementing by Ministry of Agriculture. We want still to work hard and save our soil.

Diversion weir: Not adopted. But she use Hand-dug wells and plant vegetables, apple, spices and *Rhamnus prinoides* (Gesho in Amharic) in her home garden.

Improved soil nutrient input (organic fertilizer): She has mentioned that the practice is well known around. It improves crops and vegetables production. It also reduces the cost of inorganic fertilizer. The practice was implemented by Ministry of Agriculture but still expected that we must work hard in future.



Figure 53 : mapping exercise in the women's group

Area enclosure with enrichment planting: Due to shortage of grazing lands the practice has advantages. We use cut and carry system and feed our animals at home. The practice was introduced by Ministry of Agriculture but we wish to do more.

Hand-dug wells: We uses for plants, livestock and humans. I have pepper; apple and eucalyptus tree by using water from hand dug wells. It needs less labor especially for a woman who has children less than eight years old. I have got training by regional women's EPRDF conference. We are trying to work in a better way to improve our livelihood.

Improved livestock breeds: Not adopted. It is not widely introduced in the area but there are very few in numbers. We know the use but thinking that there will be feed problem for them. There is also economical problem to have improved livestock breeds and manage.

Orchards: I just planted apple this year and will see the use in future. We have got lesson from EPRDF conference. In this watershed there are some farmers who have apple fruit ready for sell now.

Check dams: We have been doing this practice for the last three years in highlands and midlands. The lowlands are still need it but not used yet. There is an improvement which we can see on soil and water conservation in addition to soil fertility. The practice was trained by EPRDF conference.

Community pond: Especially in the upland area we need community pond. It can help us for both humans and livestock. We can plant also potato, onion and other vegetables. We know the practice but do not have money.

Pedal pump: It has different advantages. We can use it for vegetables and spices production. It is also less labor need and can be managed by women's.

Practice chosen	Location	Status in the watershed	Intervention
Grass strip along contour	Crop land	Adopted but not sufficiently	Lack of awareness
Bunds	Slopy lowland	Adopted but not sufficiently	Address labor shortage
Limiting animal movement	Crop land	Adopted	
Hillside terraces	Crop land	Adopted	
Area enclosure	Upland	Adopted	
River diversion	Near to the river	Not adopted	
Hand dug well	Homestead	Adopted	
Improved fertility management	Crop land	Adopted	
Improve livestock breeds		Not adopted	Feed shortage Access to improved

			breeds
Orchard (apple)	Midslope	Adopted	
Check dam	Gullies	Adopted	
Community pond	Upland	Not adopted	Lack of funds
Pedal pumps	Wells	Not adopted	Lack of funds

6.2.3 Difference with the existing landscape and interventions needed

Three practices have not been adopted yet, namely improved livestock breeds, community pond and pedal pumps.

Improved livestock breeds are not adopted for two reasons. Firstly it is difficult to access the improved breed variety. Secondly the improved breeds need better quality and more fodder. The watershed at this stage cannot provide sufficient high quality fodder and therefore some fodder oriented practices need to be implemented first.



Figure 54 : women having a funny discussion with the happy strategy game

The women imagined a community pond in the upland and allowing farmers to irrigate their fields through a river diversion. Nice idea, but not feasible, as it is not clear where the water would come from the fill the pond. Secondly, with the river diversion system, most of the water is likely to be lost on its way. Clearly this was a creative idea from one of the women and not an idea pushed by the government. Unfortunately it is not a realistic option.

Pedal pumps to pump water from the well are also still missing.

6.2.4 Trade-off

No trade-offs synergies, winner and loser were discussed.

6.3 Discussion from the men's group

6.3.1 Participatory mapping

The farmers started the mapping exercise by identifying the North direction and use the school as bench mark. Then they continued to map the Argenit river, then the Zefie river then the Alekit river. In terms of land use they identified the Zefie Forest (1-green) that is composed of Eucalyptus. Fridrew forest (2-green) is a community forest of eucalyptus. It has been planted for rehabilitation of the areas and livestock is kept out of the areas. Tilik meda forest (3-green) is a state owned eucalyptus forest and Kolew mareja (4-green) is a privately owned eucalyptus forest.

There is a nursery established by an NGO that produced seedlings for endogenous trees.



Figure 55 : the men's group discussing how to start to map the Zefie watershed

In terms of degraded area, they identified Zingero gedla (1-pink), despite of the fact that some people still make use of them, the land is very degraded and unproductive both for crop and grazing as well as Chebrew (2-pink) and Nadew (3-pink).

In terms of grazing area, Eyensen god (1-grey) is a communal grazing land, where also the tree nursery is located. Model bed (2-grey) is a grazing area which during the rainy season is closed and cut and carry system is applied.

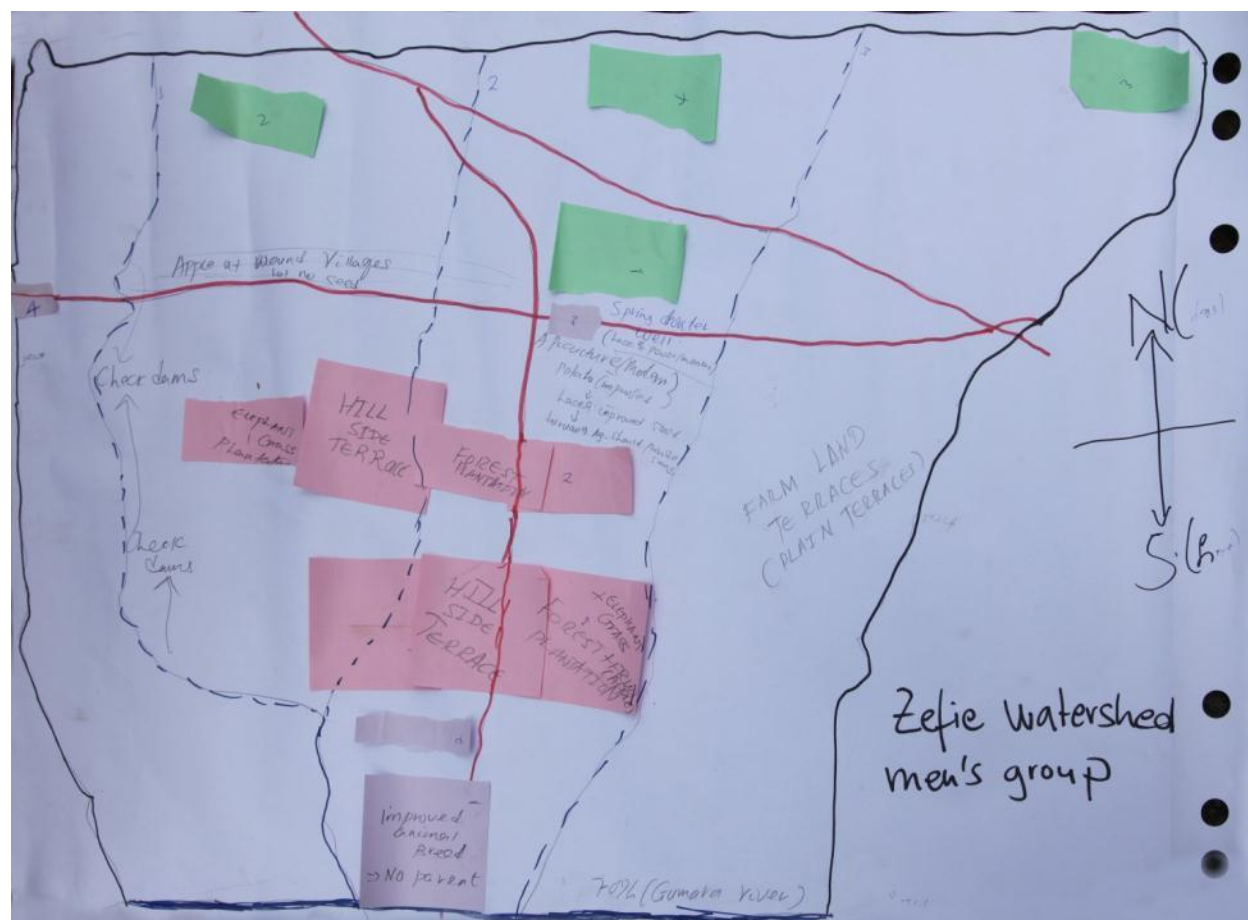


Figure 56 : map of Zefie watershed developed by the men's group

6.3.2 Preferred landscape

The farmers came up with a list of practices to populate the preferred landscape as shown in the table below.

Practice chosen	Location	Status in the watershed	Intervention
Improved potatoes	Crop land	Adopted but not sufficiently	Get access to more improved seeds through the bureau of agriculture

Compost	Cropland	Adopted	
Apple	Around settlement	Adopted but not sufficiently	Get access to seedlings
Improved livestock	Around the communal grazing land	Not adopted	Access to the breeds
Hand dug well	Around settlement	Adopted but not sufficiently	Lack of expertise
Check dams	Gullies	Adopted but not concrete	Access to concrete material and funds
Stone terraces	Mid slope	Adopted	
Afforestation	Degraded land	Not adopted	Government provided seedling
Elephant grass	On the soil bunds	Adopted	
Modern beehives	Around settlement	Not adopted	Access to credit or credit cooperative
Bunds	Mid slope	Adopted	Thanks to the campaign

Improved potatoes

Improved potatoes are available mainly around Enkokow gode. But they are facing shortage in improved seeds. They feel that the bureau of agriculture should provide more.

Compost

Compost is used in the whole watershed and they don't feel having any issue linked with it.

Apple

Apple should be planted around settlement. They initially did know very much about the technology. Some of the farmers have apple know and more and more all the farmer have the

feeling that it could become a profitable business. They lack in seedlings and knowledge to grow apple trees.

Apples could also be planted on degraded area.



Figure 57 : men's group discussing land use in Zefie

Improved livestock breeds

The farmers have the feeling that they could intensify for livestock as fodder and water would be available, but they cannot access the parent material.

Hand dug wells

There are some wells in the watershed. But more farmers would like to have wells but they lack in capacity to select the right locations. They also feel that by cooperating more among themselves and some governmental support to access material they could maybe get some more wells.

Check dams

There would be a need for concrete check dam on the Alekit river. They are lacking in capacity to build it. They wish to get some governmental support from the bureau of agriculture could provide the cement, the community would bring up the labor.

Stone terraces and bunds

Stone terraces and bunds have been built on the sloppy fields. These have been built through governmental campaigns and all the suitable area are now terraces.

Afforestation

The afforestation of degraded area should be part of the governmental campaign. Afforestation goes very slow as seedlings are not made available by the government. The recent nursery from Tana Beles might address this issue.

Elephant grass

Elephant grass is used for stabilize the bunds and terraces. As they have the material, they are using it for multiplication.



Figure 58 :farmer discovering the happy strategy game

Modern beehives

Modern beehives around settlement should be developed. But they cannot buy the hives and nor the bee colony mainly due to the lack of funds. By forming cooperation combined with credit service they could get it right.

6.3.3 Difference with the existing landscape and interventions needed

Farmers suggested two interventions that have not been adopted: afforestation and modern beehives. Afforestation seems that it has been planned but not yet implemented by the government. Farmers lack in seedlings. Also farmers sometimes would prefer to plant eucalyptus trees. But both the governmental nursery as well as the Tana-Beles nursery does not provide eucalyptus seedlings, only multipurpose tree. There is an agreement in the community that the afforestation should take place mainly through governmental intervention.

Modern beehives were suggested as practice that is not yet adopted, mainly because they do not have access to the necessary credit to start up. In principle this is a good idea, as they have apple trees that are a flowering.

Apples combined with hand-dug wells are there but more people would like to adopt the practices. They are mainly hampered by the lack of access to the seedling as well as access to dry water during the dry season and therefore would need a well or a pond.

Also they have improved potatoes seeds but would be happy to get more.



Figure 59 : women presenting their work to the men's group

6.3.4 Trade-off discussed

Farmer suggest that if the optimal landscape is implemented everyone is a winner. There are no trade-offs.

6.4 Final mixt discussion

During the discussion men challenged women's map, who bravely defended their map which was less detailed and accurate than the men's. They were happy to contribute to this exercise and they felt that they could learn from each other, also from the fact that they could share practices between highland and lowland farmers.

6.5 General impressions and lessons learnt

This was the last FGD. For the first time the women's took longer than the men's. More women showed up than invited. Among the new comers were women who cannot read or write but who wanted to participate. We decided to allow these additional women to participate. The women's group was extremely interactive, and some women despite of the fact that they cannot read or write, decided to draw houses and churches on the map. It ended up in a very funny competition. One woman asked the other one "why is your house so small?", the lady answered "don't worry, I just draw the toilet".

Both men and women's group enjoyed the mapping exercises and men seem to have discovered that their women are much smarter and literate than they had imaged.

7 Map validation

In general much more is happening on the ground than what is predicted by our maps. The reasons for this are very different for the different technologies. For apple trees for example, the suitability conditions seems to be assessed wrongly, instead of minimum temperature, elevation seems to be a better proxy. For other practice we rely on accuracy of available layers. Our river map, suggests much less perennial rivers than what we have found on the ground. Also we found river diversion around non-perennial streams on vertisols, which are used as sort of spate irrigation or irrigation for parts of the year only.

Our ground water map is very rough and is based on geological substrate. This map does not allow to identify the water pocket in the landscape due to local geological conditions, nor takes the underground water streams of non-perennial rivers into account. We might to rethink our proxy for ground water access.

Also our water harvesting suitability is based only on land use (as we are still waiting the dry spell map from Jens, which could be replaced by the aridity index). Maksenit watershed shows us some evidence where these technologies work and Shambu where they do not work. In the worst case we can use this evidence to come up our own proxy.

Soil and water conservation techniques seem to be predicted relatively accurately.

8 Lessons learnt

8.1 Promising innovations

In every watershed we came across farmers with innovative ideas that in our opinion could be a good entry point for rainwater management. Whereas in some watersheds, the entry point is a rainwater related practice we have or modeled or listed in our extended list of rainwater practices, some of the practices such as poultry were quite unexpected, but the community could make a clear case why it contributes to water management.

Table 6 shows from our perspective the most promising practice in each landscape, the hampering factor and what and who is needed to make it happen. A promising practice is a practice that is not yet or insufficiently adopted within the watershed, it is a practice that makes sense in terms of water management and that is wished by the community.

Table 6 : most promising practice in the watershed

Watershed	Most promising practice	Hampering factor	What is needed?	Who could help
Gorosole	Apple	Lack of access to seedlings		?
Shambu	Small scale poultry	Lack of knowledge	Poultry training	?
Maksenit	Beehives combined with lowland fruit trees	Access to seedling	Increase the offer from the governmental tree nursery	Governmental nursery (ICARDA)

	Small scale poultry	Disease control	Poultry training	?
Zefie	Apple	Lack in seedling	Get the local tree nursery to produce apple seeds	Tana-Beles
	combined with wells and beehives	Lack of credit	Set up an “equub”	Tana-Beles

In Gorosole, the most promising practice is the apple tree. The community would like to have apples but does not know how to access seedling. Also the community did not mention that apple need water during the dry season and therefore needs to be combined with a water access such as diversion, well or pond. This suggests that they might not know what is needed for apple trees and they might need to get some training. As no NGO is active in the area, it is difficult to identify who could help with the apple trees. Seedling could be brought from Shambu.



Figure 60 : Shambu in 2020 ? (picture taken in Machakos, Kenya)

In Shambu, small scale poultry came out as the most promising practice. As chicken are expensive farmers could get more income through poultry and more easily destock on livestock. The farmers claim that they cannot have more chicken, because it is too cold and lots of fecund eggs do not survive. They think that they need an incubator, which does not really help if there are power cuts and not back-up system. There might be option to get more chicken without incubator, by keeping more chicken together during the breeding. Also as soon as the chicken population increases disease control is needed. Expert knowledge and training would be needed to enable them to get more healthy chicken at very little costs.

Like in Shambu, poultry has been mentioned in Makenit and the same rational applies. In addition, the home gardens combined with beehives seems to be a promising practice, as more trees are planted and income of the farmers can be diversified. For those farmers who have access to water during the dry season, the major hampering factor is the access to tree seedling other than the multipurpose tree (they produce themselves). Cooperation should be sought with the governmental tree nursery and with ICARDA for practices that increase water access during the dry season.

In Zefie, similarly to Makenit a combination of fruit tree with beehives is a promising combination of practices. Apples trees are already in the watershed and the knowledge is available, but no one is producing seedlings. One could seek Tana-Beles and propose that the new tree nursery also produces apple trees.

Both for the poultry and for the tree, it is not sufficient to make sure that the farmer can supply the products but also that they have sufficient market linkages. If too many fruits or chicken come on the local market the price is likely to fall. Therefore making a functioning market linkage is crucial along the promotion of the practice. The Shambu case showed that it is relatively difficult to sell the apples, despite of their high prices in the major Ethiopian cities.

8.2 Adapting happy strategy for farmers

This focus group discussion was the first trial of the happy strategy with communities. In general the approach went well. The mapping exercise went very well for all the focus group discussions.



Figure 61 : briefing the OARI team in Ambo

In Oromia region, involving women and get them actively involved into the drawing of the map and the gluing of the land use colored papers was difficult. Facilitators in Amhara were asked to involve women more actively which worked well. Also women are more likely to be illiterate, making it more difficult to read the cards. After the Oromia experience, women were therefore allocated a card (whereas men could choose their cards). Every card was explained for every woman making sure that she knows what card she has. This worked better than letting them choose the cards.

The happy strategy worked better in locations where farmer had a clear vision of where they want to be in 5 years from now. As such, the happy strategy tool could be a very interesting tool to involve communities as part of a longer process, if a vision building exercise is implemented beforehand.

Finally, working with young people with little experience and variable level of motivation made it sometimes very difficult to implement the focus group. This also explains the difference in quality in the reporting from the different sites. But every person that contributes to the focus group in a second round, made progress. Therefore these focus group discussion should also be seen as a capacity building to our partners and our own staff in facilitation and participatory approaches. Getting a pool of facilitators who know how to implement the happy strategy game for communities could ensure better quality data collection in future.



Figure 62: The young ARARI facilitation team after a tiring day